No Model.) 4 Sheets—Sheet 2.

L. KIRCHENBAUER.

MACHINE FOR TWISTING AND PUNCHING GRILL WIRES.

No. 527,428. Patented Oct. 16, 1894.

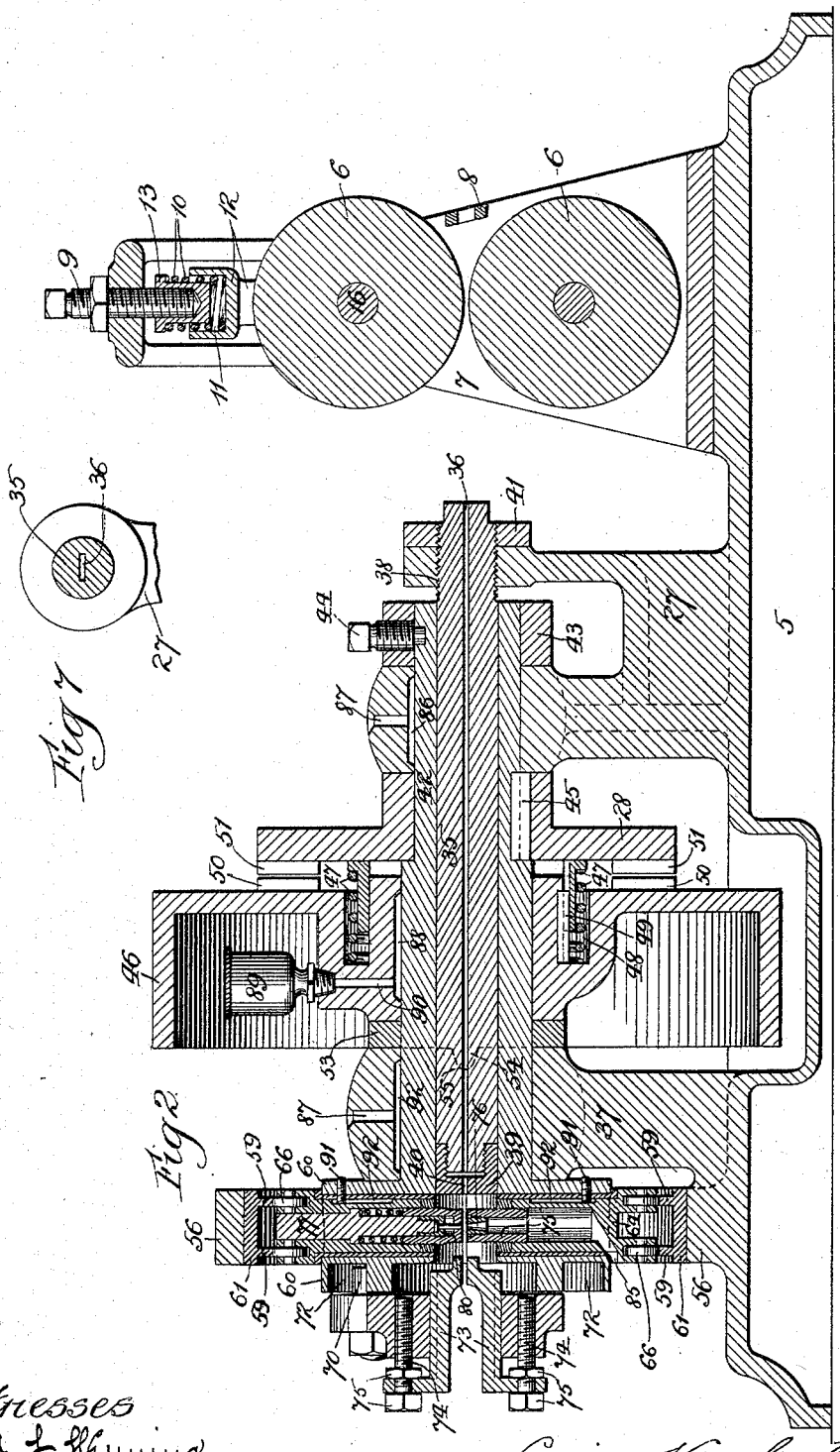

Fig 1

Fig 2

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(No Model.) 4 Sheets—Sheet 3.

L. KIRCHENBAUER.

MACHINE FOR TWISTING AND PUNCHING GRILL WIRES.

No. 527,428. Patented Oct. 16, 1894.

Fig 3

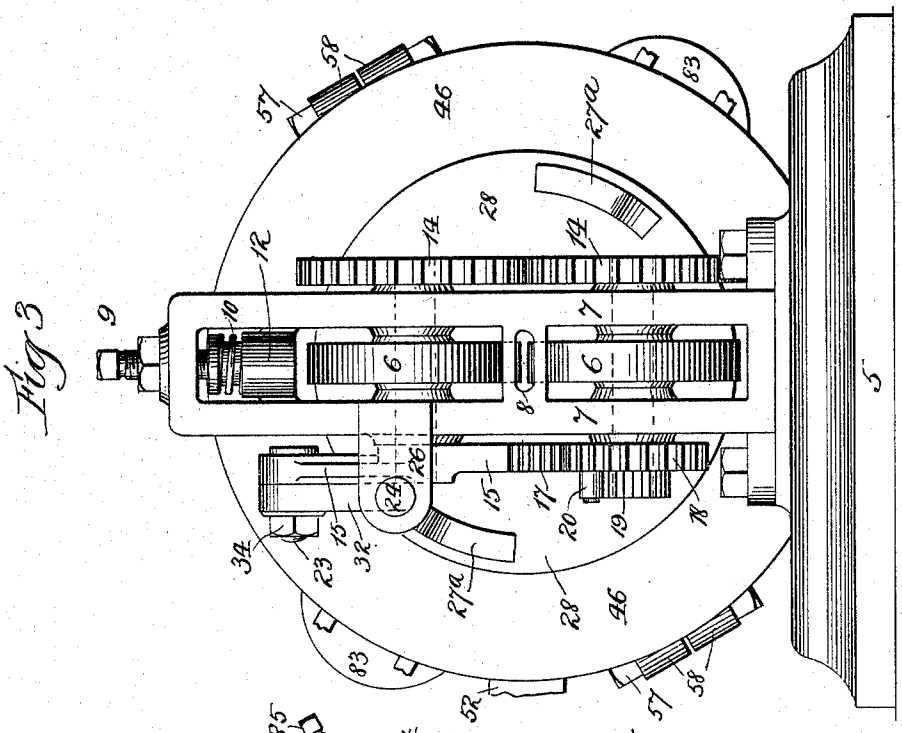
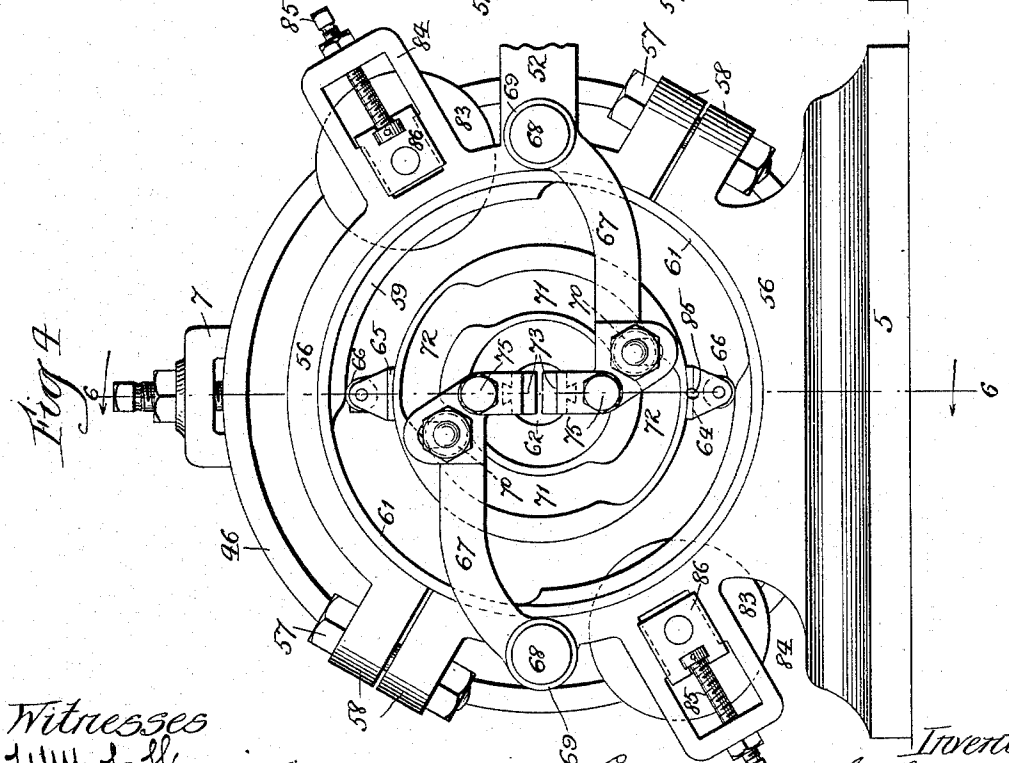


Fig 4



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(No Model.) 4 Sheets—Sheet 4.

L. KIRCHENBAUER.

MACHINE FOR TWISTING AND PUNCHING GRILL WIRES.

No. 527,428. Patented Oct. 16, 1894.

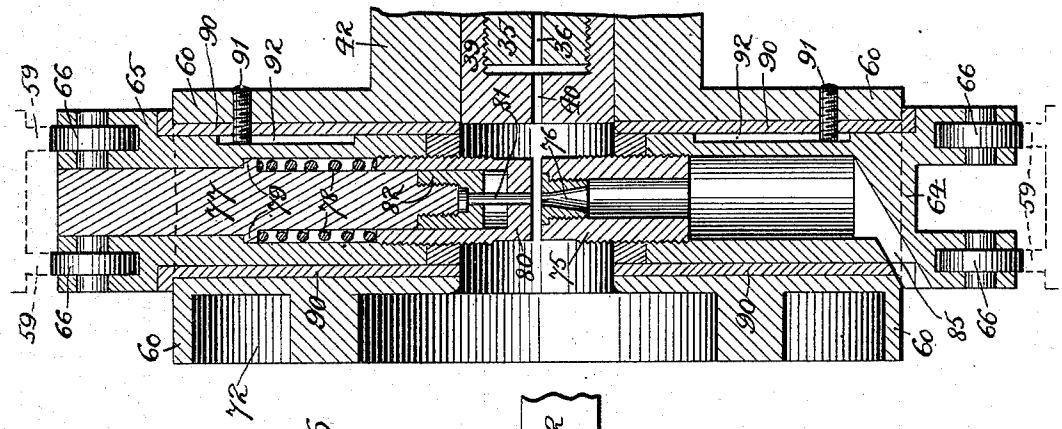

Fig 6

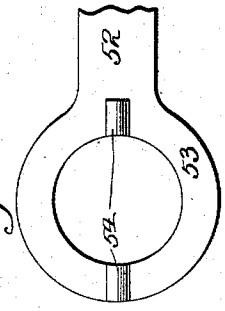

Fig 8.

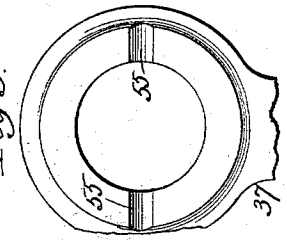

Fig 9.

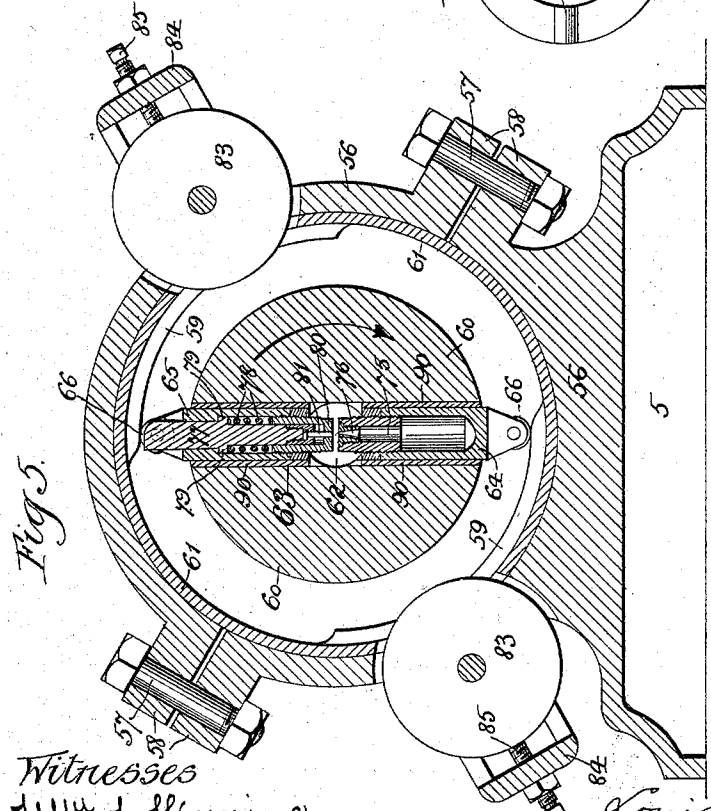

Fig 5.

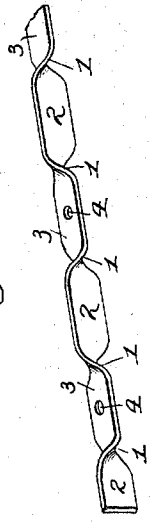

Fig 10

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UNITED STATES PATENT OFFICE.

LOUIS KIRCHENBAUER, OF CHICAGO, ILLINOIS.

MACHINE FOR TWISTING AND PUNCHING GRILL-WIRES.

SPECIFICATION forming part of Letters Patent No. 527,428, dated October 16, 1894.

Application filed February 5, 1894. Serial No. 499,071. (No model.)

To all whom it may concern:

Be it known that I, LOUIS KIRCHENBAUER, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Machines for Twisting and Punching Grill Wires or Strips, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to twisting and punching the flat wires or metal strips which are used in what is known as "grill-work," this being the term applied to the open or lattice-like partitions which are used in window, door, office and store fittings, as guards for passenger-elevator landings, and in various other situations where artistic appearance and unobstructed light and at the same time exclusion are desired. The flat strips or wires of which this grill-work is principally constructed are interlaced according to various ornamental designs and wherever two such wires or strips cross each other, they are twisted half way around so as to lie against each other flatwise; the two wires being usually secured together by rivets passed through their contacting portions. So far as I am aware the twisting of the wires or strips, and also the punching or perforating of the twisted portions, for the reception of the rivets, has been accomplished wholly by manual or hand work, and consequently the work has been slow, expensive and not uniformly perfect in quality.

Among the primary objects of my invention is included that of producing a machine which shall twist and punch these wires or strips perfectly, rapidly and inexpensively, and which shall also be capable of such adjustments as will properly vary the relative positions of the twisted and punched portions to accord with variations in the ornamental designs which the strips or wires may be used to produce; furthermore, to produce a machine of this nature which shall be automatic, uniform and reliable in its operation and easy to operate.

The above purposes, and also such others as may appear from the ensuing description, are attained by the devices illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of a machine embodying my invention. Fig. 2 is a central, vertical longitudinal section of the same. Fig. 3 is an end elevation of the machine, viewed toward its receiving end. Fig. 4 is an end elevation of the machine, viewed toward its delivery end. Fig. 5 is a transverse vertical section, taken on the line 5—5 of Fig. 1; the direction of view being indicated by the arrows applied to the section-line. Fig. 6 is a vertical longitudinal section, taken on the line 6—6 of Fig. 4; the direction of view being indicated by the arrows applied to the section-line. Fig. 7 is a transverse vertical section, taken on the line 7—7 of Fig. 1; the direction of view being indicated by the arrows applied to the section-line. Figs. 8 and 9 are detached views, respectively in front and rear elevation of the inner end of the clutch-lever and the front side of the adjacent bearing-standard, showing the engageable lugs and recesses. Fig. 10 is a perspective view of a fragment of grill wire or strip twisted and punched by a machine embodying my invention.

A product of a machine embodying my invention is illustrated in Fig. 10 of the drawings, and consists in a long narrow metal strip which is formed by successive transverse bends or half-twists 1 into alternated flat portions 2 and 3 which stand transversely at right angles to each other; the bends or twists 1 being quite abrupt, but not so much so as to present any other than a perfectly sightly appearance. As shown, the flat portions 2 are each of the same length as each of the flat portions 3, but this need not necessarily be so; the relative lengths of the flat portions being variable in accordance with the particular character of the grill-design in any given instance. Moreover, each flat portion 3 is shown as formed with a hole 4 located midway of the length and width of such portion 3, these holes being intended to receive the rivets or bolts by which the grill wires or strips are connected together, either at right angles or obliquely as required. However, it is to be understood that it is not always necessary to punch a hole, such as 4,

the cams 27ª. The opposite or front end-portion of the rod 24 is surrounded by a spiral spring 30 which is interposed between the front guide 26 of the rod and a collar or enlargement 31 on the rod. The disk 28 revolves constantly in the direction indicated by the arrow thereon in Fig. 1 and each time a cam 27ª strikes the roller 29 the rod 24 is moved lengthwise forwardly of the machine so as to compress the spring 30. As soon as a cam 27ª passes out of contact with the roller 29, the spring 30 expands and throws the rod 24 rearward lengthwise. The operative purposes of these two longitudinal movements of the rod 24 will presently appear.

Near its front end, the rod 24 carries an upwardly extending head 32 through which is formed a vertically elongated opening or slot 33. The movable pivot-pin 23, before referred to, extends through the slot 33 of the head 32 as well as through the slot 22 of the arm 15. As previously stated, the pivot-pin 23 is movable toward and away from the fixed pivot 16, and a nut 34 which is threaded upon the outer end of the pin 23 is shown as the means for retaining the pin in any of its desired positions of adjustment; this nut, when tightened, clamping the head 32 and the upper end of the arm 15 between the nut and a head on the inner end of the pin with sufficient force to retain the pivot in its required place.

It will be evident from the foregoing description that each time the rod 24 is reciprocated forward by one of the cams 27ª the head 32 will cause the pivot-pin 23 to rock the arm 15 upon its stationary pivot 16 in such manner as to swing the lower end of said arm rearward, and that the expansion of the spring 30, after each cam 27 has finished its action upon the rod 24, will reciprocate the rod 24 rearward again; the rolls 6 being turned during the forward movement of the rod and remaining stationary during the rearward movement of said rod, and the amount of movement of the rolls being more or less according as the pivot-pin 23 is farther from or nearer to the fixed pivot 16 of the arm 15.

I will now proceed to describe the mechanism by means of which the twists or transverse bends 1 are formed in the grill wire or strip so as to place the flat portions 2 of the strip at right angles to the flat portions 3 thereof.

Referring first to Figs. 1 and 7, 35 designates a horizontal non-revoluble spindle which is formed with an axial bore or channel 36 extending throughout the entire length of the spindle and opening out of the ends thereof. This channel or bore is of flat form transversely to accord with the transverse contour of the untwisted grill wire or strip, and said bore is of such dimensions as to permit said strip to pass through it. The spindle 35 extends longitudinally of the machine and is supported at its ends in the upper parts of standards 27 and 37 which rise from the bed-plate 5; the former toward the front end of the bed, and the latter toward the rear end thereof. The front standard 27 is shown as of approximately U-form, and the front end of the spindle 35 is externally screw-threaded to fit adjustably in a screw-threaded socket or opening 38 in the front part of the standard 27. The opposite or rear end of the spindle 35 is screwed into a bushing 39 which is formed with a slot or opening 40 corresponding in form with the bore 36, and accurately registering therewith, so as to permit of the free passage of the strip or stock from the spindle to the twisting-devices. A jam-nut 41 is screwed upon the outer end of the spindle 35 so as to abut against the front part of standard 27 and thus prevent the spindle from rotating, and also to retain said spindle in any desired position of longitudinal adjustment hereinafter described.

The spindle 35 is surrounded by a sleeve 42 which is capable of rotation upon the spindle and the ends of which turn directly in the bearings in the upper parts of the standard 37 and of the rear part of the standard 27; the front end of this sleeve terminating between the front and rear parts of said standard 27, and rearward movement of the sleeve being prevented by a collar 43 secured to the front end of the sleeve by a set-bolt 44, or equivalent means, and abutting against the front side of the rear part of standard 27. Forward movement of the sleeve 42 is prevented by an external head or enlargement 60 carried at the rear end of the sleeve and abutting against the rear side of the standard 37. The bushing 39, previously referred to, fits into the rear end of the sleeve 42 so as to be capable of longitudinal movement therein with the spindle 35, as hereinafter described.

The revoluble disk 27 which carries the cams 27ª for actuating the rod 24, as above described, surrounds the sleeve 42 and is keyed thereto, as at 45, or in any suitable manner so as to cause the disk and spindle to turn together. This disk 28 is situated just back of or rearward from the rear part of the standard 27, and the front end of the disk-hub abuts against the rear side of said standard 27. Just back of or rearward from the disk 28 is located the power-pulley 46 of the machine; this pulley being loose upon the sleeve 42. A spiral spring 47 is interposed between the cam-carrying disk 28 and the power-pulley 46 so as to normally force the disk and pulley away from each other.

The front end of the hub of pulley 46 is shown as recessed longitudinally, as at 48, to receive the rear end-portion of the spring 47 and the front end of said spring is shown as abutting against a continuous external shoulder on the front end of a sleeve 49 which surrounds the front end of the pulley-hub so as to permit said hub to move longitudinally within the sleeve; the front end of said sleeve

abutting against the rear side of the disk 28 and thus taking the wear due to such contact. On the front side of the pulley 46 are located a suitable number of forwardly extending lugs 50 which at times engage laterally a corresponding number of similar lugs 51 projecting rearwardly from the rear side of the cam-carrying disk 28. When the disk 28 and pulley 46 are held apart by the spring 47, the lugs 50 and 51 do not engage each other, and the disk 28 is able to remain stationary while the pulley continues to revolve. The pulley 46 is, however, intended to be moved forward so as to bring the lugs 50 into lateral engagement with the lugs 51, and during such engagement of said lugs, the disk 28 rotates with the pulley 46.

Any suitable attachments may obviously be provided for effecting the forward movement of the pulley 46, but I have shown a very compact and efficient arrangement, for this purpose, which I will now proceed to describe.

52 designates a lever, the inner end 53 of which is of annular form so as to loosely surround the sleeve 42 at a point between the front side of the standard 37 and the rear end of the hub of the pulley 46; the rear and front sides of the inner circular end 53 of the lever 52 being in direct contact respectively with the front side of said standard 27 and the rear end of said hub of pulley 46. The rear side of the inner circular portion 53 is provided with any suitable number of rearwardly extending rounded projections or lugs 54, which normally engage within correspondingly formed depressions or sockets 55 formed in the front side of the standard 37. The arrangement is such that when the lugs 54 are in the sockets 55, the pulley 46 is in its rearmost position and consequently revolves without moving the cam-carrying disk 28. By depressing the lever 52, the lugs pass out of their sockets and the lever 52 is shifted forwardly, pushing the power-pulley 46 forwardly against the spring 47, causing the lugs 50 to engage the lugs 51 and consequently compelling the disk 28 to revolve with the power-pulley 46; this revolution of the disk 28 not only causing the cams 27^a to intermittently actuate the feed-rolls, as heretofore described, but also causing the sleeve 42 to constantly revolve with the disk 28, and thus to actuate the twisting and punching devices now to be described.

At the rear end of the bed-plate 5 is located an annular vertical casing or frame 56 which extends transversely of the bed-plate and the axial center of which is coincident with the axial center of the spindle 35. This annular frame is stationary at all times and is desirably composed of any suitable number of segmental sections strongly secured together as by bolts 57 extending through pairs of lugs 58, or by any suitable means. This annular frame surrounds the head 60 of the sleeeve 42 so that said head is capable of freely rotating in the frame, and within said annular frame are located any suitable number of cams 59 arranged in oppositely disposed pairs; said cams extending transversely of the machine, and being desirably carried by a ring 61 which facilitates the removal of the cams when desired.

The head 60 of the sleeve 42 has a central axial bore 62, to permit of the free passage of the stock, and has also a transverse bore or channel 63 opening at opposite sides of the head. Within this transverse channel 63 are located two tubular gripper-carriers 64 and 65, the outer ends of which carry anti-friction rollers 66. The inner ends of the gripper-carriers 64 and 65 constitute gripping-heads which, as the carriers approach each other, grasp the stock and impart the required half turn or twists 1 thereto, in conjunction with the external holders to be presently described. The carriers 64 and 65 are moved toward each other, so as to grasp the stock, by the engagement of their rollers 66 with the cams 59, and are forced away from each other, after each twisting action, by the rearward feed of the stock (due to the action of the feed-rolls 6); the carriers being in horizontal position at such moment and consequently being separated a distance corresponding to the width of the stock or strip.

The external holding or gripping attachments consist of two carrier-arms 67 which are shown as pivoted at their outer ends, as at 68, to lugs 69 upon the annular frame 56. At their inner ends these carrier-arms are provided with anti-friction rollers 70 which run in a continuous cam-groove 71, having oppositely disposed offset portions 72. To the inner ends of these carrier-arms 67 are connected the grippers 73, said grippers being connected to the inner ends of the carrier-arms by adjusting-screws 74 which pass through the outer ends of the grippers, and the inner ends of said grippers extending slightly into the axial bore 62 of the head 60. Jam-nuts 75 embrace the outer ends of the grippers 73 so as to hold the latter in proper position of adjustment.

The above-described arrangement is such that as the head 60 revolves, the inner segments 71 of the cam-grooves move the inner ends of the carrier-arms 67 toward each other, and thus cause the grippers 73 to grasp the stock; this action occurring simultaneously with the grasping of the stock by the internal grippers 64 and 65. As the external grippers 73 do not revolve and as the spindle 35 is also non-revoluble, while the internal grippers 64 and 65 do revolve, two twists or bends 1 are made in the stock during each operation of the grippers; one bend being between the internal grippers 64 and 65 and the rear end of the spindle 35, and the other bend being between the internal grippers and the external grippers 73. By turning the spindle 35 in one direction or the other, in its screw-threaded bearing in the front part of the

standard 27 (the nut 41 being first loosened) the rear end of the spindle 35 can be set forward or backward, and by loosening the jam-nuts 75 and turning the screws 74 in one direction or the other, the grippers 73 can be set forward or backward; the length of stock between the twists 1 being accordingly increased or diminished as desired.

When the rollers 70 reach the offset portions 72 of the cam-groove in the head 60, the external grippers 73 are separated to release the stock, and at this, moment a rearward feeding of the stock is produced by the rolls 6.

I will now describe the punching attachments, by means of which the rivet-holes, such as 4, are produced in the twisted wire or strip. Into the inner end of the gripper-carrier 64 is screwed a plug 75, the inner end of which embraces a die 76, screw-threaded into said inner end of the plug, and provided with a central longitudinal bore. The outer end of the companion-carrier 65 is open and within said carrier is placed a punch-carrying plunger 77; such plunger being arranged to move longitudinally within the carrier 65. This plunger 77 is normally held at the outer limit of its movement by a spring 78 which surrounds the plunger and which is inclosed within the carrier 65; the spring 78 abutting at its outer end against a shoulder 79 on the plunger, and at its inner end against the outer end of an extension-sleeve 80 which is screw-threaded upon the inner end of the carrier 64. A punch 81 extends inward from the inner end of the plunger 77 and works through an opening in the inner end of the sleeve 80; the outer end of the punch being shown as headed and the head being confined between the inner end of the punch and the inner end of a retaining gland 82 which is screwed upon the inner end of the plunger.

The plunger 77 is forced inward at proper times by contact with one or another of any desired number of rollers 83, the spindles of which are journaled in boxes 86, movable inwardly and outwardly in radial guides 84 carried by the circular frame 56. The adjustments of the boxes 86 are effected by screws 85 working through the guides 84, and the rollers 83 are shown as protruding inwardly through the frame 56, each near the leaving ends of the adjacent cams 59. As the sleeve 35 rotates the head 60, the outer end of the plunger 77 strikes the rollers 83, each of said rollers forcing the plunger inward through the stock and into the opening of the die 76. The plug 75 has a central bore through which the waste drops and such waste escapes through a channel 85 in the outer end of the carrier 64. The rollers 83 are so placed that the punching-action occurs just as the twisting-action is completed, and before the stock is released and fed forward. When the twisting-devices are set to produce longer lengths of material between twists, one roller 83 may be drawn outward far enough to become idle; and when no punching is required, both or all of the rollers 83 may so be rendered idle.

As minor details of construction, oil cavities 86 may be formed in the bearings of the standards 27 and 37, the oil being fed to said cavities by channels 87. The hub of the pulley 46 is also shown as provided with an oil-cavity 88 fed by an oil-cup 89 delivering to the cavity by a channel 90.

In order to avoid all possibility of axial movement of the gripper-carriers 64 and 65 in the head 60, screws 91 may be inserted through the front side of the head, these screws entering longitudinal grooves 92 in the carriers 64 and 65. Furthermore, it is also desirable to provide wear-tubes 90 which are suitably secured within the transverse channel of the head 60 and against which the sides of the movable gripper-carriers 64 and 65 work.

Having thus described my invention, what I claim as new therein, and desire to secure by Letters Patent, is—

1. A grill-wire twisting machine, comprising a channeled non-revoluble spindle, a plurality of non-revoluble holders movable toward and away from each other, for grasping and releasing the wire, and a plurality of revoluble twisting-grippers also movable toward and away from each other and interposed between the non-revoluble holders and the spindle, substantially as set forth.

2. A grill-wire twisting machine, comprising a channeled non-revoluble spindle, a plurality of non-revoluble cam-actuated holders movable toward and away from each other, for grasping and releasing the wire, and a plurality of revoluble cam-actuated twisting-grippers also movable toward and away from each other and interposed between the non-revoluble holders and the spindle, substantially as set forth.

3. A grill-wire twisting machine, comprising a non-revoluble channeled and longitudinally adjustable spindle, a plurality of non-revoluble holders movable toward and away from each other and also adjustable toward and away from the spindle, and a plurality of revoluble twisting-grippers also movable toward and away from each other and interposed between the holders and the spindle, substantially as set forth.

4. A grill-bar twisting and punching machine, comprising a plurality of revoluble twisting-grippers movable toward and away from each other, and a punch carried by one of the grippers and movable toward and away from an opposite gripper and serving to form the rivet-holes in the twisted wire, substantially as set forth.

5. A grill-wire twisting and punching machine, comprising a plurality of twisting-grippers movable toward and away from each other, a die carried by one of said grippers, and a punch carried by an opposite gripper and movable upon the latter toward and away from the die, substantially as set forth.

6. A grill-bar twisting machine, comprising a set of feed rolls, a tight cam carrying disk, a loose power pulley, a reciprocating rod, a vibratory sector-arm actuated by said rod, and a pawl and ratchet gearing for the feed rolls actuated by said sector-arm, substantially as set forth.

7. A grill-bar twisting machine, comprising a set of feed-rolls, a pawl-and-ratchet gearing for intermittently actuating said rolls, a vibratory sector-arm geared to the rolls and serving to intermittently actuate the same, and a sliding-rod having an adjustable pivotal connection with the vibratory arm and thereby serving to vary the length of action of the feed-rolls, substantially as set forth.

8. A grill-wire twisting machine, comprising a set of feed-rolls, a non-revoluble channeled spindle, a plurality of non-revoluble holders movable toward and away from each other, a plurality of revoluble twisting-grippers interposed between the spindle and the non-revoluble holders, a sleeve revoluble around the spindle and channeled to receive the revoluble grippers, a cam-carrying disk tight upon the sleeve, a power-pulley loose upon said sleeve and having clutching engagement with the disk, a lever pivoted loosely upon the sleeve and having projections for engaging depressions in the machine-frame so as to throw the pulley into engagement with the disk, and a reciprocatory rod, for actuating the feed-rolls, engaged and operated by the cams on the disk, substantially as set forth.

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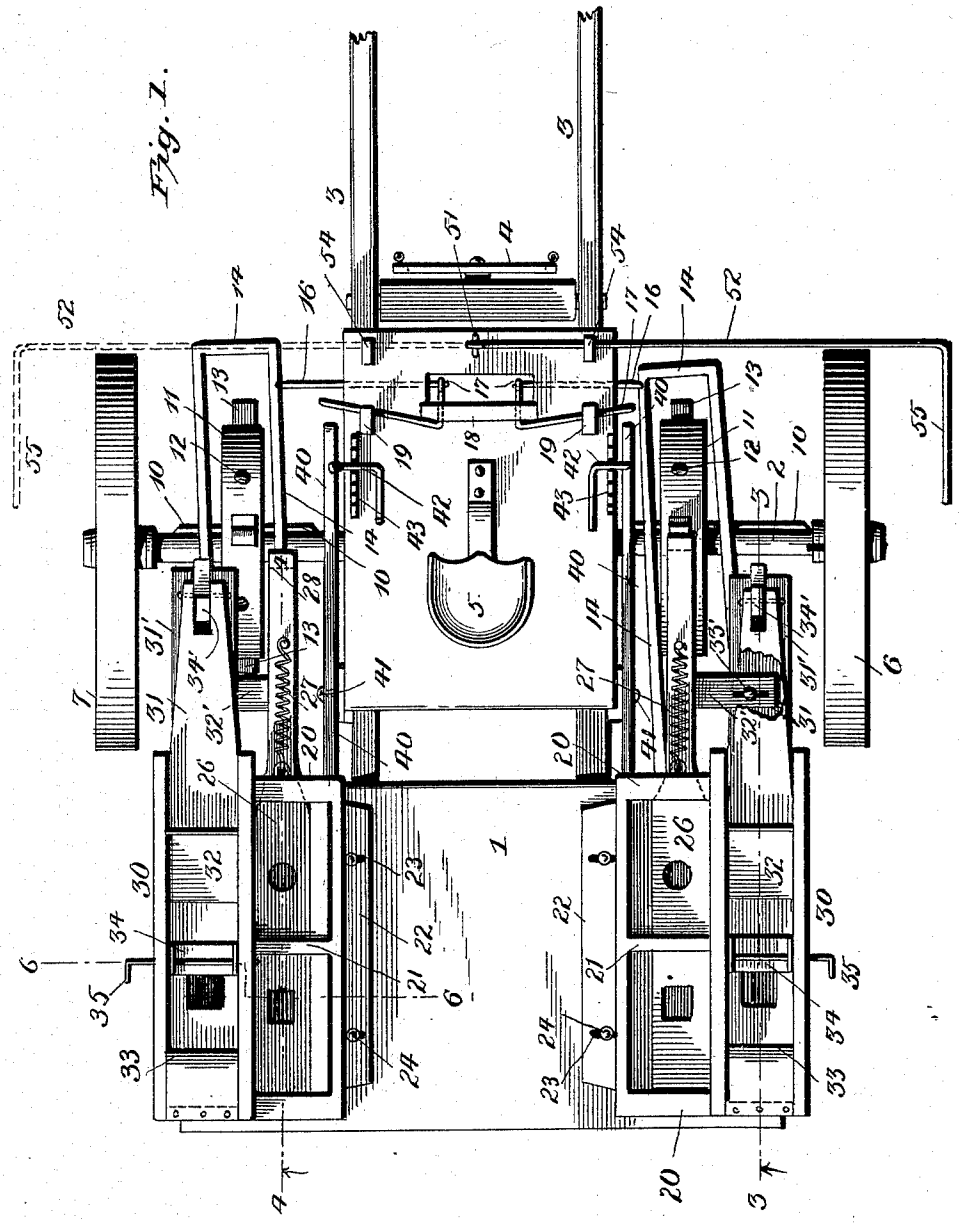
(No Model.) 4 Sheets—Sheet 1.

A. KLINK.

CORN PLANTER.

No. 527,429. Patented Oct. 16, 1894.

Fig. 1.



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